SELF-CONTAINED ORAL CLEANING DEVICE

Field of the Invention

[01] The present invention relates to oral cleaning devices such as toothbrushes and water jets and in particular to a self-contained oral cleaning device with a liquid jet feature.

Cross Reference to Related Applications

[02] The present invention is a continuation in part of U.S. Application Serial 10/315,730 filed December 10, 2002 entitled "Self Contained Oral Cleaning Device", which is a continuation in part of U.S. Application Serial 10/233,687 filed September 4, 2002, and entitled "Pneumatic-Operated Toothbrushes."

Background of the Invention

[03] Oral cleaning devices that employ a water jet feature are known in the art and such devices use an external supply of water. In one category of the prior art, a toothbrush is tethered or connected to a faucet. The water pressure from the faucet is used to propel the water through the toothbrush and out the head of the toothbrush and/or used to power a motor that is used to rotate or move bristles. For example, U.S. Patent No. 5,304,010 discloses a toothbrush that includes a hollow body, an opening by the head of the toothbrush, and a water inlet that is tethered and attached to a faucet. In another example, U.S. Patent No. 4,181,997 discloses a toothbrush that is also tethered to a faucet. However, the toothbrush uses the water pressure to power an impeller to move bristles on the head of the toothbrush. In both patents, the water is already pressurized and flowing; the water also cannot be stagnant because the toothbrush does not include any mechanism, on its own, to propel the water out of the

toothbrush. Additional toothbrushes that are tethered to a faucet or an external source of running water may be found in U.S. Patent No. 5,863,192, which discloses a toothbrush tethered to a shower head; U.S. Patent Nos. 5,500,973 and 4,257,433, which disclose toothbrushes tethered to faucets; and U.S. Patent No. 4,412,823, which discloses a toothbrush tethered to an external source of water that is pumped into and through the toothbrush.

[04] In another category of prior art, electric toothbrushes are connected to an external reservoir of water. For example, U.S. Patent No. 6,047,429 combines a mechanical toothbrush with a water jet feature. The motor used to move the bristles is also used to draw water from an outside source, not contained within the toothbrush. The water is drawn from the outside source, propelled through the neck of the toothbrush, and expelled out of the head of the toothbrush. Other electric toothbrushes which are tethered to a source of water include U.S. Patent Nos. 4,958,629 and D318,918.

[05] Various problems in both categories exist and are associated with the fact that the toothbrush must be tethered or connected to an outside source of water. In the first instance, when the toothbrush is tethered to a faucet, the user cannot use the toothbrush to spray other liquids such as antiseptic solutions. In the second instance, when the toothbrush is connected to an outside reservoir of water, the user's range of motion is limited as the end of the tether must remain in the outside reservoir at all times. In addition, when an electric toothbrush is tethered to an outside source, the user cannot control the force in which the water is propelled out of the toothbrush. The force is pre-set by the speed of the motor and can only be turned on or off. Furthermore, the units are bulky and are not made to be portable, oftentimes causing the user to own a separate toothbrush for traveling.

[06] With the onset of mechanical and electrical toothbrushes the total cost of the oral cleaning devices have increased. To offset the overall price of the devices the heads of

the toothbrushes have been made replaceable. As such, after the bristles become worn from continual use, the head may be replaced without replacing the whole unit. However, the worn heads are simply replaced with an identical head to provide the same type of cleaning. The ability to interchange heads to provide different types of cleaning, for example to interchange heads to provide a water jet for removing plaque, to provide a brush with water jet for cleaning teeth and gums, and to provide a brush or scraper with water jet for cleaning the tongue, is not widely incorporated with prior art oral cleaning devices.

[07] It is therefore an object of one embodiment of the present invention to provide a self-contained, total oral cleaning device that incorporates opening(s) for jetting a pressurized fluid into a user's mouth. The oral cleaning device in accordance with the present invention includes a reservoir for holding a liquid and a pump for pressurizing the liquid contained in the reservoir. The reservoir is contained within the oral cleaning device eliminating the need to tether the device to a faucet or attach the device to an outside source of liquid. The oral cleaning device also includes a means for releasing the pressurized liquid contained within the reservoir out of the oral cleaning device. The oral cleaning device is completely portable and assists the user in cleaning their entire mouth, including the tongue, gums, and teeth, by providing interchangeable heads. The present invention also provides the ability to change the force of the liquid jetting out of the oral cleaning device. Since the user must both fill the reservoir with a liquid and pressurize the liquid by pumping air into the reservoir, the user can change the force of the liquid jetting out of the reservoir by changing either the amount of air pumped into the reservoir or the initial amount of liquid.

Summary of the Invention

[08] In accordance with one embodiment of the present invention, a handheld portable self-contained oral cleaning device is provided that includes a refillable reservoir, which a user may be able to partially fill with a liquid up to a predetermined desired level. The reservoir, which acts as a modular handle, includes an on-board pump that a user uses to pressurize the liquid contained in the reservoir. In addition, the number of pumps a user pumps air into the reservoir determines the force of the liquid expelling (explained in greater detail below). The pressurized liquid may then be sprayed out of the oral cleaning device to assist in cleaning the user's mouth. Various interchangeable heads are incorporated herewith to provide the user with a total cleaning experience. First, a head with a nozzle that provides the user with a pinpoint direction of high-pressure jet of liquid to remove plaque similar to flossing between teeth and gums. Second, various shaped heads with bristles and a nozzle to provide the user with different brushes to clean teeth and/or their tongue as well as a jet of liquid that may assist in cleaning gums or freshening breath. Third, a head with a piece of floss and an opening to spray fluid over the floss, which assists the user in flossing between gums and teeth. Lastly, a tongue scraper head with a nozzle, which also assists the user in cleaning their tongue and provides a jet to spray liquid such as water or antiseptic directly onto their tongue while they are scraping.

[09] In a second embodiment of the present invention an oral cleaning device is provided with a body and a neck/head assembly. The device includes a reservoir contained within the body and the reservoir has an aperture for filling the reservoir with a fluid. The device further includes a replaceable cartridge of compressed gas contained within the body and two valve mechanisms. A first valve mechanism for selectively pressurizing the fluid within the reservoir with compressed gas from the replaceable cartridge and a second valve

mechanism for selectively permitting the pressurized fluid within the reservoir to release out of an opening defined in the neck/head assembly.

[10] Numerous other advantages and features of the invention will become readily apparent from the following detailed description of the invention and the embodiments thereof, from the claims, and from the accompanying drawings.

Brief Description of the Drawings

[11] A fuller understanding of the foregoing may be had by reference to the accompanying drawings, wherein:

[12] FIG. 1 is a front view of an oral cleaning device having a refillable reservoir that is capable of storing a liquid and having an on-board pump that is used to pressurize the liquid in the reservoir, wherein the pressurized liquid may jet from a nozzle in the head of the device to provide a user with a self-contained device that has a high pressure jet of liquid;

[13] FIG. 2 is a perspective view of the neck and head assembly of FIG. 1;

[14] FIG. 3a is a cross sectional side view of a neck and head assembly with a diverging misting nozzle;

[15] FIG. 3b is a perspective view of the neck and head assembly from FIG. 3a illustrated as it were misting liquid outwardly from the nozzle;

[16] FIG. 4 is an exploded view of a neck/head assembly that has a spray nozzle and bristles to brush teeth;

[17] FIG. 5 is an exploded view of a neck/head assembly illustrating a tongue brush with spray nozzle;

[18] FIG. 6 is a perspective view of a neck/head assembly illustrating a tongue scraper with a spray feature;

[19] FIG. 7a is an exploded view of a neck/head assembly with spray feature illustrating a disposable/replaceable flossing tool;

[20] FIG. 7b is a perspective view of the assembled disposable/replaceable flossing tool in FIG. 7a;

[21] FIG. 8a is an exploded view of the cleaning device of FIG. 1;

[22] FIG. 8b is a cross-sectional view of the cleaning device of FIG. 1;

[23] FIG. 9a is a perspective view of the assembly of the reservoir with the on-board pump and illustrating mating sections on the reservoir cap and the pump handle to assist the user in tightening the reservoir cap onto the reservoir;

[24] FIG. 9b is a perspective view illustrating the manner in which the on-board pump is threadably attached to the reservoir using the novel reservoir cap and pump handle mating sections;

[25] FIG. 9c is an alternate embodiment of mating section defined as pump mechanism that includes a keyed shaft that is fitted into a keyed reservoir cap;

[26] FIG. 10a is a cross sectional view of a pump mechanism that includes channels in the cylinder to release back pressure;

[27] FIG. 10b is a cross view of the means to release back pressure illustrated in FIG. 10a;

[28] FIG. 10c is a top view of the means to release back pressure illustrated in FIG. 10a;

[29] FIG. 11a is a cross sectional view of a pump mechanism illustrating long channels incorporated to reduce the maximum pressure allowed into the reservoir and thus eliminating the need of a pressure release valve;

[30] FIG. 11b is a cross sectional view of a pump mechanism illustrating shortened channels incorporated to increase the maximum pressure allowed into the reservoir;

[31] FIG. 12a is a perspective view of a weighted end that is placed on the end of the hose inside of the reservoir, illustrating an end with channels grooved to the center of the weighted end;

[32] FIG. 12b is a perspective view of a weighted end placed on the end of the hose inside of the reservoir, illustrating an end with projecting ribs;

[33] FIG. 13a is a perspective view of a device that includes a lever for operating the spray button;

[34] FIG. 13b is an enlarged perspective view of the lever and valve mechanism from FIG. 13a;

[35] FIG. 14 is an alternative embodiment of the self contained oral cleaning device showing a shortened tube and a reservoir that is threaded on the top aperture and the bottom aperture to allow the reservoir to be completely replaceable;

[36] FIG. 15a is a cross sectional view of another embodiment illustrating a device that includes a refillable reservoir pressurized by a replaceable compressed air cartridge;

[37] FIG. 15b is a partial perspective view illustrating the device of FIG. 15a being filled with a liquid;

[38] FIG. 15c is a perspective view illustrating the device of FIG. 15a illustrating the replaceable compressed air cartridge;

[39] FIG. 16 is a cross sectional view of an oral cleaning device that sprays pressurized water and includes mechanically rotating bristles both of which are powered by a motor mechanism that is driven by a replaceable compressed air cartridge; and

[40] FIG. 17 is a cross sectional view of an oral cleaning device that includes a pneumatic motor that uses compressed air from a replaceable cartridge to rotate bristles.

Detailed Description of the Embodiments

[41] While the invention is susceptible to embodiments in many different forms, there are shown in the drawings and will be described herein, in detail, the preferred embodiments of the present invention. It should be understood, however, that the present disclosure is to be considered an exemplification of the principles of the invention and is not intended to limit the spirit or scope of the invention and/or claims of the embodiments illustrated.

[42] Referring now to FIG. 1, there is disclosed in accordance with the present invention an oral cleaning device generally referenced to as numeral 10. The oral cleaning device includes a body 12 (or handle) that may be gripped by a user. As will be described in detail below, the body 12 is further defined as a refillable reservoir that a user may partially fill with a fluid, for example, the fluid may include a gas, such as air, or a liquid, such as water or an antiseptic solution used for cleaning a user's mouth and freshening breath. The oral cleaning device also includes a means for pressurizing the fluid in the reservoir. The pressurizing means is preferably an on-board pump 14. Once the fluid is pressurized, the fluid in the reservoir may be released by depressing a button 20. The button 20 (illustrated in FIGS. 2 and 3) opens a valve mechanism that controls the flow of the pressurized fluid out of

the reservoir. The fluid once released, travels through a neck 16 that extends outwardly from the body 12 to a head 18. As illustrated in FIG. 1, the head 18 includes a soft tip nozzle 120 that permits the user to clean portion of their teeth and gums by jetting a pinpoint stream of liquid onto the area the user intends to clean. The neck/head assembly may be fixed onto the body 12 or preferably interchangeable with other neck/head assemblies to provide the user with different cleaning implements.

[43] As shown in FIG 2, the neck/head assembly includes a soft tip nozzle 120 that provides a pinpoint jet of liquid into the users mouth, which can also be directed by user. Moreover, the user can place the soft tip nozzle 120 in between the teeth and gums to simulate a water pick action. Referring now to FIGS. 3 through 7b, various interchangeable neck/head assemblies are shown. In FIG. 3a and 3b, the head 18a includes a diverging mister 300 which causes the pressurized liquid ejecting from the head 18a to fan outwardly therefrom. This assembly would provide the user with a general cleaning and rising apparatus. In FIG. 4, the head 18b contains bristles 124 and a nozzle 126. In addition the head 18b is shaped to provide the user with a brush better suited for their teeth, along with a nozzle to jet liquid or fluid for cleaning gums and teeth and rinsing. The nozzle 126 is also shorter than the soft tip nozzle 120 such that the user does not feel the tip during use. In FIG. 5, the head 18c contains a nozzle 120 and a plurality of bristles 124 but contains a wider cross section than the head 18 in FIG. 4. This provides the user with a cleaning device that is better suited to clean the user's tongue. In FIG. 6, the head 18d does not contain bristles or a nozzle; the head 18d includes a projected edge 130 to scrape the user's tongue. The head 18d defined as a tongue scraper also includes at least one opening but preferably multiple openings 121 to spray liquid while the user is scraping their tongue. In FIGs. 7a and 7b, the head 18e includes an opening 121 or nozzle that sprays liquid onto a flossing element. The head 18e includes a grooved region 250

that is sized to removably receive (in a frictional engagement) a disposable flossing tool 252. The disposable flossing tool 252 includes a section of flossing material 254 that is stretched over a cavity that is created between two opposable arms 256, which extend in an arc from a center support region 258. The center support region 258 frictionally fits into the grooved region 250 such that the disposable flossing tool 252 may be held securely in place but also may be easily removed by the user. When the disposable flossing tool 252 is secured to the head 18e of the neck/head assembly, the section of flossing material 254 is in alignment with the opening 121 such that the ejecting fluid flows over the section of flossing material 254. The fluid contained in the reservoir may be antiseptic or mouth wash for which the user can spray directly onto their tongue, between teeth or gums, or in the mouth while brushing, scraping, rinsing or flossing.

[44] Referring now to FIGS. 8a and 8b, the oral cleaning device 10, from FIG. 1, includes a refillable reservoir 30 that also serves as a main portion of the body 12 or handle which the user grips when using the oral cleaning device 10. The refillable reservoir 30 is attached at one end (bottom aperture 32) to a reservoir threaded end 32a. The threaded end 32a may be secured to the reservoir 30 by sonic welding, or other types of securing means to provide an air tight seal about the two pieces. Alternatively, the threaded end 32a and the reservoir 30 may be blow molded as a single piece.

[45] The reservoir 30 is removably attached about an on-board pump 14 and attached at the other end (top aperture 34) about the neck 16. Preferably, the on-board pump 14 is attached about the bottom aperture 32 such that the on-board pump 14 may be easily removed and reattached. This permits the user to pour a liquid (or other fluid) into the reservoir 30 via an opening in the threaded end 32a. However, it is also easy to implement alternative means to refill the reservoir such as but not limited to having a separate resealable inlet. In this

instance, the on-board pump 14 would not have to be removable and could be permanently attached thereto.

[46] The on-board pump 14 includes a pump cylinder 40 that slides into the reservoir 30 through the threaded end 32a and the bottom aperture 32 (best seen in FIG. 8a and 8b). Secured to one end of the pump cylinder 40 is a one-way valve cap 42. The one-way valve cap 42 allows air to be pumped into the reservoir 30, which permits the user to pressurize the liquid (or fluid) inside the reservoir 30. The one-way valve cap 42 also prevents any liquid (or fluid) inside the reservoir 30 from entering the pump cylinder 40. The one-way valve cap 42 includes a flexible valve seal 44 and a valve cap 46. The valve cap 46 attaches to the end of the pump cylinder 40 and includes openings 48 to permit air to travel through. The flexible valve seal 44 is then attached to the valve cap 46 such that the flexible valve seal 44 covers the openings 48 in the valve cap 46. When the user is pumping air through the pump cylinder 40, to pressurize the reservoir 30, air in the valve cap 46 travels through the openings 48 pushing and bending the flexible valve seal 44 away from the openings 48, allowing air to enter into the reservoir 30. This also occurs when the pressure inside the reservoir 30 is lower than a maximum pressure pre-defined by a pressure release valve 52 (discussed in greater detail below). As soon as the user stops pumping air through the pump cylinder 40, the pressure in the reservoir 30 pushes against the flexible valve seal 44 and seals the openings 48, preventing liquid in the reservoir 30 from escaping via the one-way valve cap 42.

[47] Inserted into the pump cylinder 40 is a piston shaft 50 that includes the pressure release valve 52. The piston 54 attached to the top of the piston shaft 50 has a groove 56, which receives a seal 58. The piston 54 also has notches 60 (FIG. 8a) running perpendicular to the groove 56. While the piston shaft 50 is being pulled away from the pump cylinder 40, the seal 58 moves against the top portion 62 of the groove 56, allowing air to enter the pump

cylinder 40, above the piston 54 via the notches 60. Subsequently, when pushed into the pump cylinder 40, the seal 58 moves against the bottom portion 64 of the groove 56, preventing air from escaping the pump cylinder 40. As such, when the piston shaft 50 is pushed into the pump cylinder 40, air inside the pump cylinder 40, above the piston 54 will be forced into the reservoir 30, again as long as the pressure inside the reservoir 30 is lower than the maximum pressure provided for on the pressure release valve 52.

[48] When the pressure inside the reservoir 30 is greater than the maximum pressure provided for by the pressure release valve 52, the air inside the pump cylinder 40 above the piston 54 will vent through the pressure release valve 52. The pressure release valve 52 includes a release housing 66, a release ball 68, a release spring 70, and a release cap 72. The release ball 68 is held by the release spring 70 against a release aperture 74 defined in the release housing 66. When the pressure in the reservoir 30 is greater than the pressure exerted by the release spring 70 on the release ball 68, the air will push against the release ball 68 compressing the release spring 70 permitting the air to vent through the release aperture 74 and into the piston shaft 50. Eventually the air will seep out of the device 10 through pump reservoir cap 76.

[49] The reservoir 30, pump cylinder 40, and piston shaft 50 are secured and captured by various end caps that secure them separately to the device 10. The reservoir 30 is threadably attached to a reservoir cap 76, which may be removed when filling the reservoir 30 with a liquid. A reservoir gasket 78 may be positioned between the reservoir 30 and reservoir cap 76 to prevent liquid (or fluid) inside the reservoir 30 from leaking. The pump cylinder 40 extends through the reservoir gasket 78 and reservoir cap 76 and is secured to a pump cylinder cap 80. Extending through the pump cylinder cap 80 is the piston shaft 50, which is attached to a pump handle 82. The user is also prevented from pulling the pump piston 50 entirely out

of the pump cylinder 40 because the piston 54 on the piston shaft 50 is larger than an opening defined in the pump cylinder cap 80.

[50] As illustrated in FIGs. 9a and 9b, the on-board pump 14 is shown partially expanded. The on-board pump 14 is inserted through the threaded end 32a and the bottom aperture 32. The reservoir cap 76 is then threaded or secured onto the threaded end 32a. To assist the user in threading the reservoir cap 76 onto the bottle crown 32a, the reservoir cap 76 is provided with a plurality of tabs 77 that align with raised fins 83 on the interior portion of the pump handle 82. The user places the reservoir cap 76 into the pump handle 82 such that the raised fins 83 key into spaces between the tabs 77 on the reservoir cap 76. This provides the user with an abundant amount of leverage when loosening or tightening the reservoir cap 76 onto the reservoir 30, making the process of loosening or securing the reservoir cap 76 easier.

[51] Referring now to FIG. 9c, in an alternative configuration, the piston shaft 50 includes keyed projections 310 that are matched with grooves 312 on the bottom portion of the reservoir cap 76. When the pump handle 82 is turned, the piston shaft 50 rotates therewith, because it is secured to the inside portion of the pump handle 82. Therefore, the turning of the pump handle 82 will cause the reservoir cap 76 to be loosened or tightened.

[52] Since the operation of the on-board pump 14 has already been partially explained, it can be further stated that when in operation a user can remove the on-board pump 14 by separating the reservoir cap 76 from the reservoir 30. This permits the user to partially fill the reservoir 30 with a liquid or other fluid. The reservoir 30 is preferably made of a clear material to allow the user to view the amount of liquid in the reservoir 30. However, the reservoir may be partially covered leaving a section or window area uncovered such that the user may view the inside portion or the reservoir 30. Alternatively, since the filing of the

reservoir 30 is from the bottom aperture 32, the user may view the filing process therethrough eliminating the need to view through any portion of the reservoir. After partially filling the reservoir 30, the user re-attaches the on-board pump 14 by inserting the pump cylinder 40 into the reservoir 30 and securing the cap 76 to the reservoir 30. The user then can extend the piston shaft 50 out of the pump cylinder 40 by holding both the pump handle 82 and the reservoir 30 and pulling the pump handle 82 away from the reservoir 30. Air will then enter the pump cylinder 40 by the piston 54. The user then pushes the piston shaft 50 back into the pump cylinder 40, forcing air through the one-way valve cap 42 and into the reservoir 30. Repeatedly pumping air into the reservoir 30 will pressurize the liquid contained therein. Since excess pressure is not desired, when the pressure inside the reservoir 30 is substantially equal to the maximum pressure set by the pressure release valve 52, the air will no longer enter the reservoir 30 but will instead vent out of the pump cylinder 40 through the pressure release valve 52. Once the fluid or liquid inside the reservoir 30 is pressurized the user may release the pressurized liquid through a nozzle located in the head 18 of the oral cleaning device 10.

[53] It may be further stated that the user can alter not only the force of the jetting liquid (or fluid) exiting the device 10 but also the duration such force is maintained. To alter the force of the jetting liquid (or fluid), the user may learn that for a specific water level inside the reservoir the user must pump air into the reservoir ten times (pressurizing the reservoir to a desired pressure). By reducing the number of times the user pumps air into the reservoir, the desired force of the liquid (or fluid) jetting out of the device 10 will decrease. In addition, the duration the force of the liquid (or fluid) jetting out of the device 10 is directly related to the level of liquid (or fluid) inside the reservoir for a specific pressure. As such, if the user reduces the liquid or (or fluid) level, but maintains the desired pressure inside the reservoir 30,

the duration this desired force is maintained will increase. Similarly, if the user increases the liquid (or fluid) level, the duration of force or pressure will decrease. As such it may be preferred to have a fill line on the reservoir 30 that permits the user to fill the reservoir to a predetermined amount. This would provide the user with an optimum force of jetting liquid (or fluid) (when pressurized to the maximum pressure) for an optimum maximum duration. In addition, the secondary fill lines can relate to various head attachments, providing optimum settings for different cleaning tasks.

[54] The invention also utilizes a means to release any back pressure that has built up during the pumping process. Illustrated in FIGS. 10a through 10c, the piston cylinder 40 includes channels 320 about the top portion of the cylinder 40. When the piston 54 reaches the top portion of the cylinder 40 the back pressure is released around the seal 58 positioned in the groove 56 of the piston 54 via the channels 320. This also keeps prevents the piston shaft 50 from being pushed outwardly at a high pressure, when the user stops pumping.

[55] Moreover, it has be found that the length of the channels 320 effects the amount of maximum pressure allowed to be pumped into the reservoir 30. If the maximum pressure allowed into the reservoir 30 is dropped below the maximum pressure the reservoir 30 can hold without popping, then the pressure release valve 52 may be eliminated. Referring now to FIGS. 11a and 11b, given a set length defined by the cylinder 40, the longer the channels 320 the lower the maximum pressure allowed into the reservoir 30. Illustrated in FIG 11a, the cylinder 40 is 12 cubic units with channels 320 that are 3 cubic units, leaving only 9 cubic units for which the piston can travel before the back pressure is released. The maximum pressure (psi) possible, using standard pressure formula, that could enter the reservoir would thus be the total cubic length (12) divided by the length of the channel (3) times the conversion of atmospheric pressure to psi (14.7) or 58.8 maximum psi possible. Illustrated in FIG. 11b,

the cylinder 40 is still 12 cubic units but the channels 320 are shortened to 1 cubic unit, leaving all 12 cubic units for which the piston can travel. Using the same pressure formula, the maximum pressure possible into the reservoir is (12) times (14.7) or 176.4 psi. If the reservoir 30 is only rated to handle a maximum pressure of 100 psi, then either a pressure release valve must be installed or the channels 320 must be a length that would reduce the pumping force such that the maximum possible pressure inside the reservoir is rated pressure or 100 psi.

[56] Referring back to FIGS. 8a and 8b, to transport the liquid (or fluid) from the reservoir 30 to the nozzle, a hose or tube 84 is placed through the top aperture 34 of the reservoir 30 and into the reservoir 30. The length of the hose may vary and the flexibility of the hose may vary depending upon use. The tube or hose 84 may contain a cap 86 on the end of the hose that is placed within the reservoir 30 and includes an annular opening (not shown) such that pressurized liquid may travel through the cap 86 and into the hose 84. The cap 86 may also be weighted to keep the opened end of the hose 84 near the bottom of the reservoir 30, which in turn helps evacuate the entire contents of the reservoir 30, even if the user is tilting or turning the device 10. However, when jetting the contents out of the reservoir 30 through the hose 84, a vacuum effect is created in the hose 84, by the release of pressure in the reservoir 30 therethrough, such that it is possible that the hose 84, if flexible or long enough, stretches itself to a length that the end of the hose 84 attaches or vacuum seals itself against an interior wall of the reservoir 30, thereby preventing fluid from escaping. To prevent this from occurring, a cap 86a, illustrated in FIG. 12a, can include a plurality recessed or grooved channels 150 that lead into a centered aperture to prevent the entire end from becoming vacuum sealed against the wall of the reservoir 30 during evacuation of the reservoir 30. In an alternative embodiment, FIG. 12b, another cap 86b can include a plurality of

projecting ribs 152 to provide grooved regions 154 between the projecting ribs 152. The projecting ribs 152 are positioned radially away from the centered opening such that pressurized liquid or fluid is capable of entering the hose 84 through the centered opening via the grooved regions 154 even if the cap 86b is pressed against the wall of the reservoir 30.

[57] Referring back to FIGS. 8a and 8b, the other end of the hose 84 is attached to a releasing/preventing mechanism 88 that when activated allows the pressurized liquid or fluid to travel through the neck 16 and out of the device 10. The other end hose 84 is preferably secured through an opening 92 in a top reservoir cap 90 that is secured to the top aperture 34 of the reservoir 30, along with a top reservoir gasket 91. The opening 92 is reinforced with a grommet 94 that places the hose 84 in fluid communication with an inlet 96 defined in the releasing/preventing mechanism 88. The releasing/preventing mechanism 88 also includes a valve piston 102 that may be moved to an open position (allowing pressurized liquid or fluid to travel through) by a button 20. A valve spring 100 exerts a force onto the button 20 and the valve piston 102 that normally keeps the releasing/preventing mechanism 88 in a closed position (not allowing pressurized liquid or fluid to travel through). A valve pin 104 holds the button 20 in position with the valve piston 102 and valve spring 100. The releasing/preventing mechanism 88 and other components described for opening and closing the mechanism 88 is housed within a two piece housing 110. The front portion of the housing 110 includes an opening 112 to permit the button 20 to be pressed by a user. As mentioned, the releasing/preventing mechanism 88 is in a closed position unless the button 20 is pressed and held down by a user.

[58] Referring now to FIGs. 13a and 13b, the device 10 may be equipped with a more ergonomic means of activating the releasing/preventing mechanism 88. A lever 160 is positioned to permit the user to grasp and operate the device 10 more naturally without the

need to contort and hold a finger or thumb on the button 20. The lever 160 when pushed inwardly (with the users hand or inside portion of one of the fingers), holds the button 20 inwardly such that the device 20 is operated. As soon as the lever 160 is released the device is turned off. The lever 160 includes inwardly facing knobs 162 that reside in corresponding notches 164 on the outside portion of the two piece housing 110, which contains the releasing/preventing valve mechanism 88.

[59] When activated, the pressurized liquid or fluid travels through the releasing/preventing mechanism 88 and out an exit 106 defined thereon. The exit 106 of the releasing/preventing mechanism 88 is in fluid communication with a channel 108 running through the neck 16. The neck 16 is secured to a neck base 114 that is removably attached to the exit 106. A neck o-ring 116 is preferably positioned between the neck base 114 and the two piece housing 110. The channel 108 travels through the neck 16 to at least one opening 121 in the head 18. Preferably a nozzle is positioned in the opening 121, in communication with the channel 108, and held in place by a nozzle cap 122.

[60] Illustrated in FIG. 14 an alternative embodiment illustrated a similar oral cleaning device with a reservoir 30 that includes threaded ends at the top aperture 34 and at the bottom aperture 32. Thus the entire reservoir 30 may be replaceable with a pre-filled reservoir of antiseptic or other type of mouth cleaning fluid. In addition, the hose 84 may be shortened such that the device when tipped over or upside down will still operate, because the end of the hose 84 would be closer to the top aperture 34 and not exposed to a portion of the reservoir that may have already be emptied or evacuated. In addition, the present invention eliminates the problem of clamping the hose 84 onto the releasing/preventing mechanism 88 by connecting the entire hose 84 thereto within the reservoir 30. This also permits the hose 84

to be extremely flexible and the pressure within the entire hose 84 is also equal to the pressure within the reservoir 30.

[61] In an alternate embodiment, the manual pump is removed from the device while the portability and self containment of the entire unit is maintained. Referring now to FIGS. 15a - 10c, an oral cleaning device 200 has a body 202 that houses a refillable reservoir 204 and an internal means for pressurizing the contents in the reservoir 204. The reservoir 204 is refillable by removing an end cap 207 positioned over an aperture 206 into the reservoir 204 preferably located about the bottom handle 208 of the device 200. In FIG 15b the aperture 206 is located on the side of the bottom handle 208, however, the aperture 206 may be directly located on the bottom of the handle 208. The user is able to refill the reservoir 204 by placing the aperture 206 against a faucet 250 and letting water, running from the faucet 250 flow into the reservoir 204.

[62] When the reservoir 204 is filled, a user pressurizes the reservoir 204 by pressing and holding a charging button 210. The charging button 210 when pressed opens or releases compressed air stored in a removable cartridge 212. The compressed air flows from the removable cartridge 212 through a valve mechanism 214 operable by the charging button 210 and through a one-way valve 205 and into the reservoir 204 pressurizing the liquid contained therein. The cartridge 212 when depleted is removed and replaced with a full second cartridge by taking a cover 216 off of the body 202 (FIG 15c).

[63] The user can release the pressurized fluid contained in the reservoir by pressing a spray button 218 located on the body 202 of the device 200. The pressurized fluid travels through the neck and head assembly 220 and is jetted out of a nozzle 222 positioned in the top portion of the neck and head assembly 220.

[64] Referring now to FIG 16, the oral cleaning device 200 may further include a pneumatic motor 230 which utilizes the compressed air in the replaceable cartridge 212 to rotate a plurality of bristles 232. The device 200 includes a third button 231 that is pressed when the user wants the bristles 232 to rotate. The pneumatic motor 230 includes a means to rotate a shaft 240 when pressurized air is forced into the pneumatic motor 230. Such pneumatic motors can be found in U.S. Patent No.: 6,626,079, incorporated herein by reference. The shaft 240 is attached to a crown gear 242 that is meshed with a gear head 244 secured to the plurality of bristles 232. When the shaft is rotated the rotation is transferred to the bristles 232.

[65] To operate the device, the user first fills the reservoir 204 with a liquid. Once the reservoir 204 is filled, the user can then press the charging button 210 to release compressed air into the reservoir and to release compressed air to the pneumatic motor 230. After the reservoir is pressurized, the user can press the spray button 218 to spray pressurized liquid out from a plurality of bristles 234 located adjacent to the rotating bristles 232.

[66] In another embodiment of the present invention, illustrated in FIG. 17, an oral cleaning device 260 may simply include a replaceable compressed air cartridge 262 that is connected to a pneumatic motor 264. The pneumatic motor 264 is operably connected to rotating bristles 266. The bristles 266 rotate when the user operates a releasing/preventing mechanism 268 similarly disclosed above. The cartridge 262 is capable of being removed from the device 200 through an annular opening 270 defined by the end of the body 261. An end cap 272 that may be removed by the user closes the opening.

[67] As explained above, the present invention includes the ability to jet out a pressurized fluid, not only inclusive of a liquid but also a gas. For example, the user may simple pump air into and pressurize the air inside the reservoir. Once the reservoir contains a

sufficient amount of pressurized air, the user may release it by pressing the button. While not as efficient as expelling pressurized liquid, in some instances the liquid, especially an antiseptic liquid, may be too sensitive for the user. Moreover, if pressurized gas such as air was the only intentional use of the device, the pump does not have to be removable, as the user can continuously refill the reservoir with air without removing the pump.

[68] From the foregoing and as mentioned above, it will be observed that numerous variations and modifications may be effected without departing from the spirit and scope of the novel concept of the invention covering a self-contained device incorporating a reservoir, an on-board pump, and a nozzle into a single device with interchangeable heads to provide various oral cleaning actions. It is to be understood that no limitation with respect to the specific methods and apparatus illustrated herein is intended or inferred. It is intended to cover by the appended claims all such modifications as fall within the scope of the claims.